DOCUMENT RESUME

ED 191 713 SE 031 939

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TITLE Special Report on Science.
INSTITUTION Illinois State Board of Education, Springfield.
PUB DATE Feb 80
NOTE 25p.

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS Curriculum Development: *Data Bases: *Enrollment: *Science Curriculum: *Science Education: Secondary Education: *Secondary School Science: *State Surveys

ABSTRACT

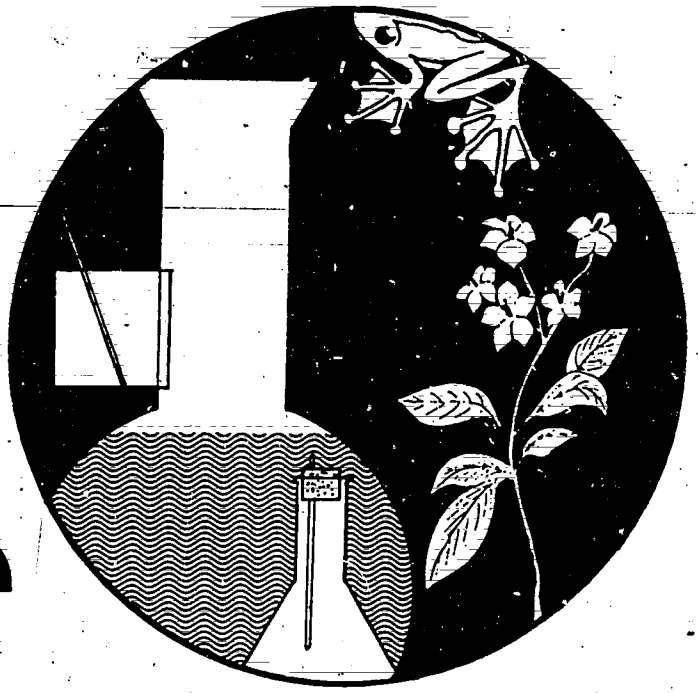
This report presents the findings of a statewide census of basic science curriculum data in the state of Illinois. This census, conducted in 1977, was designed to produce normative data relative to science course offerings, enrollments, and curricular activities in Illinois public secondary schools and to establish a data base on secondary school science curriculum. The report includes: (1) highlights summary: (2) interpreting the findings: (3) schools in the census: (4) the typical natural science program in Illinois high schools: (5) the typical natural science program in Illinois junior high schools: (6) the required high school natural science courses: (7) the required junior high school natural science courses: (8) enrollment in high school students by sex: and (9) enrollment in junior high school students by sex. (HM)

Illinois
Secondary School
Course Offerings

Illinois
State Board of
Education

Research
and Statistics

Special Report on Science



SPECIAL REPORT ON SCIENCE

February, 1980

FOREWORD

In 1977 the Illinois State Board of Education in cooperation with the Illinois Association for Supervision and Curriculum Development conducted a Census of Secondary School Course Offerings, Enrollments, and Cocurricular Activities. This was the first such statewide census of basic curriculum data in Illinois. The Census was designed to produce normative data relative to offerings and enrollments in Illinois public secondary schools and to establish a source of data on secondary school curriculum at the peak of public high school enrollment.

The Census project was conducted and the general report was written by Dr. William L. Humm, Research Scientist, Research and Statistics Section, Illinois State Board of Education. The special report on science was written by Dr. Gordon Lindstrom, Science Department, Proviso Township High School District 209, and edited by Dr. Humm. It is based on statistics from the Census project.

Observations and conclusions in this report are those of the writer and do not necessarily represent policies or views of the Illinois State Board of Education or the State Superintendent of Education.

Joseph M. Cronin

Joseph M. Cronin
State Superintendent of Education

Generally, the patterns of enrollment in the seven typical high school science courses are similar across schools in different community types. Required status of some courses does not appear to account for the differences in enrollment from course to course. This could mean that a large proportion of students who are required to enroll would still take those courses if they were not required.

Enrollment in science across high school size varies from course to course but is less variable when total science enrollment is considered.

Required status of science courses accounts for a small portion (13%) of enrollment. However, smaller schools have a greater percentage of enrollment in required science courses than do larger schools.

Female enrollment is greater than that of males in most biological science courses, while male enrollment is greater in the physical sciences and remedial science.

In junior high schools, general science grade 7 and grade 8 are required for most students (96%). ISCS, biology-life science, physical science, or earth science are required for large percentages of enrolled students (100, 83, 62, and 83 percent respectively) and appear to be the courses required in place of grade 7 or grade 8 general science in some schools.

Similar patterns of enrollment across community type are observed for general science grade 7 and grade 8. This is expected because these courses are required for most students.

Analysis of science enrollment by school size indicates that: the smallest schools (200 or less enrollment) require all students to enroll in the typical courses they offer; and the largest schools require enrollment in the smallest number of specific science courses.

INTERPRETING THE FINDINGS

Enrollment data from the Illinois Census of Secondary School Course Offerings can be summarized in a number of ways to show the typical course of study for a specific subject area. To interpret the findings from the large volume of course offerings data, it is necessary to reduce and categorize the data according to criteria that capitalize on their usefulness in describing the status of courses in the secondary schools. Then, the findings may be most beneficial in making decisions about state, regional, and local programs of study.

When one's interest is the courses in which most students are enrolled, percentage of enrollment can be one means of reducing the volume of data. The percentage of enrollment that is used as a criterion for making this reduction can be determined from the census data; natural points of separation among different enrollment volumes occur. That approach has been taken in this report.

THE SCHOOLS IN THE CENSUS: DEMOGRAPHIC CHARACTERISTCS

Census data were collected from 459 public junior high schools and 704 public high schools. The participating schools represent 97.0 percent of the junior high schools and 95.4 percent of the high schools in the defined population of the Census.

Schools were classified by grade level composition, by school size, and by community type. Schools classified as junior high schools were typically two-year, grade 7-8 schools (88 percent). Another 10 percent were three-year, grade 7-9 schools. High schools include four-year, grade 9-12 schools (75 percent); three-year, grade 10-12 schools (5 percent); and junior-senior high schools including grades 7-12 (16 percent).

There is a direct relationship between school size and community type, with larger schools located in central cities, smaller schools in rural areas. This relationship is particularly strong for high schools, as indicated in Table D-1. Most of the rural high schools (97 percent) had under 1000 students, even when six-year (7-12) schools were included. On the other hand, 66 percent of the urban schools had enrollments over 1000. Table D-2 shows the range and quartile data for high schools in the Census.

TABLE D-1. ILLINOIS PUBLIC HIGH SCHOOLS INCLUDED IN THE CENSUS OF COURSE OFFERINGS BY SIZE AND COMMUNITY TYPE, 1976-77

	Community Type									
Size	Central City		Suburb		Independent City		Rural		All	%
<200	3		2		1		112		118	16.8
200- 499	6		8		36	97%	181		231	32.8
500- 999	7		17	94%	40		49		113	16.1
1000-1699	25		48		19		6		98	13.9
1700-2599	83% 36	94%	52		5		3		96	13.6
2600 or >	18		30		0		0		48	6.8
ALL	95		157		101		351		704	
%	13.5		22.3		14.3		49.9			

TABLE D-2. ENROLLMENT SUMMARY STATISTICS FOR PUBLIC HIGH SCHOOLS INCLUDED IN THE CENSUS OF COURSE OFFERINGS, 1976-77

Mean	Smallest	Largest	25th Percentile	Median	75th Percentile
951.5	24	4869	264	504	1511

Table D-3 presents data by school size and community type for junior high schools. Junior high schools generally enrolled over 500 students (90 percent) in central cities, between 200 and 1000 in suburbs (93 percent) and independent cities (80 percent), and under 500 (95 percent) in rural areas. Table D-4 gives the range and quartile data for junior high schools in the Census.

TABLE D-3. ENROLLMENT SUMMARY STATISTICS ON PUBLIC JUNIOR HIGH SCHOOLS INCLUDED IN THE CENSUS OF COURSE OFFERINGS, 1976-77

	Community Type					
Size	Central City	Suburb	Independent City	Rural	All	%
<200	0	9	15	59	83	18.1
200- 499	3	105	46	40	194	42.3
500- 999	22	117	23	5	167	36.4
1000 or >	4	9	2	0	15	3.3
ALL	29	240	86	104	459	100.0
%	6.3	52.3	18.7	22.7		
	90%	93%	80%	95%		

TABLE D-4. ENROLLMENT SUMMARY STATISTICS ON PUBLIC JUNIOR HIGH SCHOOLS INCLUDED IN THE CENSUS OF COURSE OFFERINGS, 1976-77

Mean	Smallest	Largest	25th Percentile	Median	75th Percentile
451.5	37	1321	237	416	632

These demographic data are important for two reasons. First, they substantiate the scope of the data-gathering effort and justify use of the term "Census," since virtually all designated schools in fact submitted the requested data to the State Board of Education. Thus, the findings based on the data have enhanced value for decisionmakers. Second, they provide a foundation for investigating the relationship between course offerings and course requirements on the one hand with course enrollment on the other. For while data on school expenditures, facilities, personnel, and overall enrollments have been routinely gathered, data on how these inputs have been combined to provide the visible, operating school program as experienced by students have been lacking.

THE TYPICAL NATURAL SCIENCE PROGRAM IN ILLINOIS HIGH SCHOOLS

The purpose of this section is to describe the typical natural science program in Illinois high schools. "Typical" will be defined in terms of the percent of high school students in Illinois who are enrolled in courses.

When science courses are listed in order of percent of state enrollment, highest listed first, they appear as follows:

TABLE 1. SCIENCE COURSES IN WHICH THE LARGEST RELATIVE PROPORTIONS OF ILLINOIS HIGH SCHOOL STUDENTS ARE ENROLLED

Course Title	# Schools Offering	% of State Total	% Students Enrolled	% of Schools' Enrollment
Biology, 1st Yr	620	88.1	12.9	14.7
Chemistry, 1st Yr	597	84.8	5.6	6.1
Phy Science 1 & 2 Yr	307	43.6	5.4	10.1
Gen Science, Gr 9	291	41.3	4.9	12.4
Earth Science	227	32.2	3.4	7.0
Physics, 1st Yr	535	76.0	2.6	3.1
Biology, 2nd Yr/adv.	354	50.3	2.1	3.9
BSCS Yellow/Special	45	6.4	1.3	11.7
Biology-Life Science	85	12.1	1.3	8.7
Remedial Science	37	5.3	1.1	10.0
BSCS Green/Blue Versions	52	7.4	1.1	11.7

The first seven courses account for 68% of the science enrollment and are the only courses that are offered in more than 30% of the schools. The criterion used to designate "typical" courses in mathematics required that such courses have a minimum of 3% of state enrollment. The criterion used in this report on natural sciences is a minimum of 2% of the statewide enrollment for the following reasons: (1) Physics has traditionally been a part of the natural sciences course offerings and is still offered by more than three-quarters of Illinois high schools (76%). Even though its enrollment is relatively small, it is of sufficient interest to curriculum planners to be included. (2) Biology 2nd year/advanced is also included with the typical courses because half of the schools offer it. Further, it is often the course chosen by students who take but one advanced course.

Four courses have percentages of state enrollment between 1 and 2 percent. They are BSCS Yellow/special materials --1.3%, biology-life science --1.3%, remedial science --1.1%, and BSCS Green-Blue versions --1.1%. The percents of schools that offer these courses are 6.4%, 12.1%, 5.3%, and 7.4%, respectively. When percent of students enrolled in the schools that offer those four courses is examined, it can be seen that the BSCS enrollment rate approaches that of first year biology throughout the state. This suggests that BSCS biology is the only biology course offered in those schools.

Seven natural science courses enroll between one-half and one percent of the high school students statewide; collectively they have 9.25% of the science enrollment. Eighteen additional courses enroll less than one-half percent of the students and are offered by 10% or less of the high schools in Illinois.

Table 2 lists the seven natural science courses that will be considered typical of the high school curriculum in this report. Additional courses are included in some sections when they are significant to specific analyses or findings of those sections.

Typical High School Science Courses by Community Type

The most noticeable feature of the data in Table 2 is the relative similarity of enrollments across community types. While there are differences among types for biology first year, all but rural schools differ by less than one-fifth of one percent. Percents of enrollment for independent city, suburban, and central city schools are 12.8%, 12.6%, and 12.7% respectively. Rural schools enroll 14.2%. Similarities in enrollment across community types also occur for chemistry first year (rural-- 5.0%, independent city--5.5%, suburban--6.6%, and central city--4.5%), physical science 1st/2nd year (rural--5.7%, independent city--4.3%, suburban--5.9%, and central city--5.0%), and physics 1st year (rural--2.1%, independent city--2.3%, suburban--2.8%, and central city--2.6%).

General science grade 9 enrollment is 5.9% in rural, 4.6% in independent city, 2.7% in suburban, and 7.8% in central city schools. A comparison with enrollments in first year biology and physical science indicates that the smaller enrollment in general science in suburban schools is not a result of larger enrollments in those courses.

Earth science enrollments in rural and central city schools are similar (2.4% and 2.2% respectively), as are enrollments in independent city and suburban schools (4.2% and 4.4% respectively). Biology 2nd year/advanced enrollment in rural schools is the fifth largest for the seven typical courses. It is lowest in enrollment for independent city, suburban, and central city schools.

Required status of the typical science courses does not appear to account for the enrollment patterns across community type. For example, the percent of total enrollment in first year biology in suburban and central city schools is similar, 12.6% and 12.7% respectively. However, percent enrollment in required first year biology is 18.2% and 5.9% for suburban and central city schools respectively (Table 8). This could indicate that enrollment in first year biology is equally attractive to students throughout the state and that a large proportion of those who are required to enroll would do so even if not required. Similar comparisons can be made between the data in Table 2 and Table 8 for physical science 1st/2nd year and earth science. General science grade 9 enrollment and required status of that course appear to be related for rural, independent city, and suburban schools, but not for central city schools.

Generally, the patterns of enrollment in the seven typical high school science courses are similar across community type. Enrollment in 2nd year/advanced biology shows greater variation than the other courses. And, general science grade 9 is a notable exception to the general pattern, with suburban schools having significantly smaller enrollments than other schools.

Typical High School Science Courses By School Size

Enrollment in biology 1st year varies by as much as 31% (between schools of less than 200 students at 15.9% of their enrollment and schools of 2600 or more students at 10.9% of enrollment). The differences in percent of enrollment in biology among the schools in the other size categories are less; 14.2% for schools of 200 to 499, 12.8% for schools of 500 to 999 students, 13.1% for schools of 1000 to 1699 students and 13.7% for schools of 1700 to 2599 students (see Table 3). First year chemistry enrollment shows small increases as school size increases up to about 2600, then decreases in schools of 2600 or more. Enrollment, however, is still relatively higher in the large schools than in the smallest schools.

TABLE 2. SCIENCE COURSES THAT ENROLL 2% OR MORE OF ILLINOIS HIGH SCHOOL STUDENTS BY COMMUNITY TYPE

	Percent of Enrollment			
Course Title	Rural	Independent City	Suburb	Central City
Biology 1st Yr	14.2	12.8	12.6	12.7
Chemistry 1st Yr	5.0	5.5	6.6	4.5
Phy Science 1&2 Yr	5.7	4.3	5.9	5.0
General Science Gr 9	5.9	4.6	2.7	7.8
Earth Science	2.4	4.2	4.4	2.2
Physics 1st Yr	2.1	2.3	2.8	2.6
Biology 2nd Yr/Adv	2.7	1.9	2.3	1.5

Physical science 1st/2nd year, general science grade 9, and earth science 1st/advanced individually show no pattern of enrollment across school size. But when enrollments in each of these three are combined within school size categories, similarity is noted. The total percentages of state enrollments for these three according to school size are:

<200	200-499	500-999	1000-1699	1700-2599	2600 >
18.4%	14.9%	13.1%	12.7%	14.6%	12.5%

While the percentage differences among the size categories are still significant in two cases (32% relative difference between the smallest schools and the largest, with over 16% relative difference between the schools with 200-499 students and the largest schools), the differences are much less than those found when each course is considered separately. Thus, total enrollment in science is less variable across school size than is enrollment in individual science courses.

Enrollment in physics 1st year and biology 2nd/advanced tends to be slightly higher in the smaller and the larger schools, with medium size schools having the lowest relative enrollments.

TABLE 3. SCIENCE COURSES THAT ENROLL 2% OR MORE OF ILLINOIS HIGH SCHOOL STUDENTS BY SCHOOL SIZE

	Percent of Enrollment					
Course Title	<200	200-499	500-999	1000-1699	1700-2599	2600 >
Biology 1st Yr	15.9	14.2	12.8	13.1	13.7	10.9
Chemistry 1st Yr	4.7	4.8	5.3	6.2	6.1	5.3
Phy Sci 1&2 Yr	6.0	5.2	6.3	3.7	6.3	5.4
Gen Science Gr 9	9.7	7.7	3.9	5.0	4.3	4.0
Earth Science	2.6	2.1	3.0	4.0	4.0	3.1
Physics 1st Yr	2.5	2.3	1.9	2.4	2.8	3.0
Biol 2nd Yr/Adv	2.7	2.8	1.9	2.0	2.0	2.3

THE TYPICAL NATURAL SCIENCE PROGRAM IN ILLINOIS JUNIOR HIGH SCHOOLS

Nine natural science courses enroll 2% or more of Illinois junior high school students. General science grade 7 and general science grade 8 enroll about 36% respectively (see Table 4). These courses are required for 96% of the enrolled students and consequently are the courses with the highest enrollments (see Table 10). General science grade 9 enrolls 2.0%, ISCS grade 7 enrolls 3.5%, and ISCS grade 8/grade 9 enrolls 2.7%, ISCS is a required course for the students reported as enrolled. It is probable that the schools that require the ISCS courses have chosen them as grade 7 and 8 science requirements instead of the usual general science.

Biology 1st year is required in one-fourth of the schools offering it and enrolls about 2% of the students in the state. Also, four-fifths of the schools that offer biology-life science require their students to enroll. Thus, 83% of the students enrolled are in the required courses. It is probable that these courses replace the more typical general sciences courses in those schools. Similarly, 83% of the enrollment in earth science is in required courses. It is reasonable to conclude that these two courses, like ISCS, biology 1st year, and biology-life science, are required in some schools in lieu of general science.

Fourteen other science courses reported in the survey account collectively for less than 3% of the total junior high school science enrollment. Less than one-half of one percent of the enrollment is reported in all "other" science courses. In general, the typical junior high school science program is one that requires students to enroll in general science, ISCS, biology 1st year, biology-life science, physical science, or earth science. General science enrolls the majority of grade 7 and 8 science students, and it appears that the other courses are required in lieu of general science in some schools. These typical courses are ones which are part of a science sequence that continues through the high school level.

Typical Junior High School Science Courses by Community Type

Patterns of enrollment across community type appear for general science grades 7 and 8. Proportionate enrollments in general science grade 7 are similar for rural (34.9%), independent city (35.9%), and suburban schools (37.8%); but central city school enrollment is lower at 29.1%. A similar pattern exists for general science grade 8 where enrollment is 35.1% in rural, 34.3% in independent city, 37.4% in suburban, and 27.9% in central city schools.

Biology-life science, earth science, and ISCS enrollments show no patterns across community type. One noteworthy feature is the absence of enrollment, and probably lack of offering, of ISCS in central city schools. Biology 1st year increases in enrollment from rural (1.6%) to independent city (1.9%) to suburban (2.0%) to central city schools (4.7%).

Physical science 1st/2nd year has similar enrollment in rural (2.7%), independent city (2.5%), and suburban schools (2.8%), with central city schools having less enrollment (1.4%).

TABLE 4. SCIENCE COURSES THAT ENROLL 2% OR MORE OF ILLINOIS JUNIOR HIGH SCHOOL STUDENTS

Course Title	J.H.S. Offering Course # of Schools	J.H.S. Offering Course % of State Total	Course Enrollment % of State Enrollment	Course Enrollment % of Schools' Enrollmen
General Science Gr 7	364	79.3	36.2	46.0
General Science Gr 8	358	78.0	35.6	46.0
General Science Gr 9	28	6.1	2.0	19.0
ISCS, Gr 7	33	7.2	3.5	53.2
ISCS, Gr 8	30	6.5	2.7	47.9
Biology, 1st Yr	36	7.8	2.2	19.1
Biology-Life Science	49	10.7	4.7	39.5
Physical Science, 1&2 Yr	34	7.4	2.6	24.7
Earth Science, 1st/Adv	47	10.2	4.1	32.2

Typical Junior High School Science Courses by School Size

Enrollment by school size parallels to an extent the enrollments by community type (see Table 6). Schools in rural areas are generally smaller than those in suburbs and central cities. ISCS grades 7 and 8 enroll no students in the largest schools. Schools of the other size categories enroll similar percentages, 3.8%, 3.6%, and 4.0% in schools of less than 200, of 200-499, and 500-999 students respectively in ISCS grade 7. Corresponding enrollments in ISCS grade 8 are 3.8%, 3.9%, and 2.4%.

The largest schools have a noticeably higher enrollment (4.2%) in biology 1st year than do the other schools (2.3% for less than 200, 0.7% for 200-499, and 2.9% for 500-999); this, however, may be related to grade level organization of the schools. But, the three categories of smaller schools have noticeably larger enrollments in biology-life science (4.9%, 5.1%, 4.8% for schools of less than 200, 200-499, and 500-999 students respectively). Schools of more than 1000 enrolled 1.8% of the students in the course.

Physical science 1st/2nd year enrollment increases slightly as school size increases (2.1% in schools less than 500, 2.7% in schools 500-999, and 3.3% in schools of 1000 or more students). Earth science 1st/advanced shows no consistent pattern of enrollment across school size.

TABLE 5. SCIENCE COURSES THAT ENROLL 2% OR MORE OF ILLINOIS JUNIOR HIGH SCHOOL STUDENTS BY COMMUNITY TYPE

	% of Enrollment			
Course Title	Rural	Independent City	Suburb	Central City
General Science Gr 7	34.9	35.9	37.8	29.1
General Science Gr 8	35.1	34.3	37.4	27.9
General Science Gr 9	0.6	3.7	0.4	10.2
ISCS Gr 7	5.0	3.8	3.8	0.0
ISCS Gr 8 & Gr 9	5.7	2.7	2.7	0.0
Biology, 1st Yr	1.6	1.9	2.0	4.7
Biology-Life Science	7.0	5.3	4.0	5.4
Physical Science 1&2 Yr	2.7	2.5	2.8	1.4
Earth Science 1st/Adv	6.0	4.4	3.3	6.0

TABLE 6. SCIENCE COURSES THAT ENROLL 2% OR MORE OF ILLINOIS JUNIOR HIGH SCHOOL STUDENTS BY SCHOOL SIZE

	% of Enrollment			
Course Title	<200	200-499	500-999	1000>
General Science Gr 7	38.7	38.9	35.0	32.5
General Science Gr 8	39.6	40.3	32.6	34.8
General Science Gr 9	0.0	0.4	2.5	5.9
ISCS Gr 7	3.8	3.6	4.0	0.0
ISCS Gr 8/Gr 9	3.8	3.9	2.4	0.0
Biology, 1st Yr	2.3	0.7	2.9	4.2
Biology-Life Science	4.9	5.1	4.8	1.8
Physical Science 1&2 Yr	2.1	2.1	2.7	3.3
Earth Science 1st/Adv	4.4	3.0	4.1	7.8

THE REQUIRED HIGH SCHOOL NATURAL SCIENCE COURSES

Twenty-two science courses in grades 9 through 12 were reported by one or more schools as being required for graduation. Table 7 lists seven courses that enroll 2% or more of high school students in the state and are considered the typical courses of study in this report. Of those seven courses, only four were identified as required by some schools; 75 schools require biology 1st year, 51 require physical science, 84 require general science grade 9, and 22 require earth science. Eighteen additional courses are required but have less than 2% of the statewide science enrollment.

The number of students enrolled in all required science courses comprises about one-eighth of the total enrollment in science. The four typical courses that are required comprise about 8% of the total science enrollment. The data indicate that the required status of science courses accounts for a relatively small portion of science enrollment.

General patterns of enrollment, as percent of total enrollment in the course across community type, can be noted for physical science 1st/2nd year, general science grade 9, and earth science 1st/advanced (see Table 8). As schools become more "urban", the percent of enrollment in these courses diminishes. No consistent pattern is indicated for biology 1st year.

No pattern of enrollment by school size is evident for biology 1st year. But for physical science 1st/2nd year, general science grade 9, and earth science 1st/advanced (see Table 9), the relative percent of enrollment in required courses decreases as school size increases. Thus, smaller schools usually have a greater percentage of enrollment in required science courses than do the larger schools.

THE REQUIRED JUNIOR HIGH SCHOOL NATURAL SCIENCE COURSES

Seventeen courses are required by one or more junior high schools. Among these 17 courses, are the nine courses that enroll 2% or more of the students statewide and that are considered typical. About 96% of the enrollment statewide in general science grade 7 is in required courses. Similar percentages in other courses are 96% in general science grade 8, 50% in general science grade 9, 100% in ISCS grade 7, 100% in ISCS grades 8 and 9, 37% in biology 1st year, 83% in earth science 1st/advanced, 83% in biology-life science, and 62% in physical science. Eight other required courses collectively enroll less than 2% of the students.

Typical Junior High School Science Courses That Are Required By Community Type

Two findings are readily noticeable from Table 11. General science grade 9 is required only in independent city and central city schools where 48% and 67% respectively of the total course enrollment is in required courses. Central city schools appear to require only general science grades 7, 8, and 9, biology-life science, and earth science 1st/advanced.

Biology 1st year shows a large variation from no enrollment in central city schools to 3% in independent city schools to 56% in suburban schools, and 62% in rural schools. Percentages of enrollment in other required courses are similar across the various community types.

TABLE 7. NUMBER AND PERCENT OF ILLINOIS HIGH SCHOOLS THAT REQUIRE THE TYPICAL SCIENCE COURSES WHEN OFFERED AND PERCENT OF ENROLLMENT IN THOSE COURSES

Course Title	n	%	% Required Enrollment in Course
Biology 1st Yr	75	12.1	13.9
Physical Science 1&2 Yr	51	16.6	17.0
General Science Gr 9	84	28.9	25.0
Earth Science	22	9.7	7.8
Chemistry 1st Yr	None		
Physics 1st Yr	None		
Biology 2nd/Adv	None		

TABLE 8. TYPICAL HIGH SCHOOL SCIENCE COURSES THAT ARE REQUIRED BY COMMUNITY TYPE: Number Enrolled (n) and Percent of Total Enrollment in the Course (%)

	Rural		Independent City		Suburban		Central City	
Course Title	n	%	n	%	n	%	n	%
Biology 1st Yr	2976	17.5	987	9.7	6738	18.2	1319	5.9
Physical Sci. 1 & 2 Yr	2480	36.3	1120	33.2	1902	11.0	663	7.5
Gen Science Grade 9	3335	47.1	1164	32.3	1507	18.8	2117	15.3
Earth Science	760	26.6	289	8.6	746	5.8	0	0.0

TABLE 9. TYPICAL HIGH SCHOOL SCIENCE COURSES THAT ARE REQUIRED BY SCHOOL SIZE: Number Enrolled (n) and Percent of Total Enrollment in the Course (%)

Course Title	< 200		200 to 499		500 to 999		1000 to 1699		1700 to 2599		2600 or >	
	n	%	n	%	n	%	n	%	n	%	n	%
Biology 1st Year	674	24.0	1946	17.9	934	9.2	2270	12.8	5512	19.6	684	4.0
Phy Sci 1st and 2nd Year	518	48.5	1381	35.1	1701	34.2	1043	21.1	460	7.9	1062	12.6
Gen Sci Grade 9	958	55.6	3068	52.1	1044	34.2	2414	35.4	639	7.2	0	0.0
Earth Sci	217	47.3	464	29.6	614	25.8	256	4.7	244	2.9	0	0.0

TABLE 10. NUMBER AND PERCENT OF ILLINOIS JUNIOR HIGH SCHOOLS THAT REQUIRE THE TYPICAL SCIENCE COURSES WHEN OFFERED AND PERCENT OF ENROLLMENT THAT IS REQUIRED IN THOSE COURSES

Course Title	Schools Requiring Course		% Required Enrollment in Course
	n	%	
General Science Gr 7	349	95.9	96.1
General Science Gr 8	343	95.8	95.6
General Science Gr 9	8	32.1	50.2
ISCS Grade 7	33	100.0	100.0
ISCS Grade 8/Grade 9	30	100.0	100.0
Biology 1st Year	9	25.0	37.1
Biology-Life Science	39	79.6	83.1
Physical Science 1&2 Yr	18	52.9	62.2
Earth Science 1st/Adv	38	80.9	82.9

TABLE 11. TYPICAL JUNIOR HIGH SCHOOL SCIENCE REQUIRED COURSES BY COMMUNITY TYPE: Number Enrolled (n) and Percent of Total Enrollment in the Course (%)

Course Title	Rural		Independent City		Suburb		Central City	
	n	%	n	%	n	%	n	%
General Science Grade 7	8057	100.0	11,754	94.2	46,725	97.1	5534	86.8
General Science Grade 8	8095	100.0	11,209	93.9	45,671	95.9	5543	90.8
General Science Grade 9	0	0.0	611	48.0	0	0.0	1488	67.0
ISCS Grade 7	1160	100.0	1312	100.0	4486	92.7	0	0.0
ISCS Gr 8/Gr 9	1155	88.7	949	100.0	3354	98.8	0	0.0
Biology 1st Yr	243	62.3	21	3.2	1461	56.4	0	0.0
Biology-Life Sci	1362	84.9	1657	90.1	4009	78.8	1043	88.7
Physical Science 1st/2nd Yr	486	79.3	402	46.2	2416	47.5	0	0.0
Earth Science	1374	100.0	1448	94.0	3342	80.5	791	59.9

Typical Junior High School Science Courses That Are Required By School Size

Significant characteristics of enrollment in required courses by school size are shown in Table 12. The statistics indicate that schools of less than 200 students that offer the courses listed require all students to enroll. Thus, in the smallest junior high schools, all students enrolled in general science grade 7 and general science grade 8, ISCS grade 7, ISCS grade 8, biology 1st year, biology-life science, physical science 1st/2nd year, and earth science 1st/advanced are in courses that are required.

Schools of 1000 students or more are somewhat less likely than smaller schools to require enrollment in a specific science course. The percents of required enrollment by course are: general science grade 7--94%, general science grade 8--98%, general science grade 9--62%, biology-life science--100%, and earth science--27%.

With a few exceptions more than 90% of the enrollment in science grade 7, general science grade 8, and biology-life science (and if schools of 1000 or more students are excluded--ISCS grade 7, ISCS grade 8/9, and earth science) is in required courses.

Required enrollment in general science grade 9 increases from 29% in schools of 200 to 499, to 46% in schools of 500 to 999, to 62% in schools of 1000 or more--a consistent increase in percent of enrollment with increases in school size. Biology 1st year and physical science 1st/advanced show a decrease in required enrollment as school size becomes greater, indicating perhaps that these courses are more likely to be part of a slightly broader elective/ selective science program in larger schools.

TABLE 12. TYPICAL JUNIOR HIGH SCHOOL REQUIRED SCIENCE COURSES BY SCHOOL SIZE: Number Enrolled (n) and Percent of Total Enrollment in the Course(%)

Course Title	< 200		200-499		500-999		1000 >	
	n	%	n	%	n	%	n	%
General Science Grade 7	4355	100.0	24,519	97.0	38,052	95.5	5211	94.0
General Science Grade 8	4461	100.0	25,071	95.7	35,138	94.6	5848	98.4
General Science Grade 9	0	0.0	83	29.0	1392	46.1	629	62.1
ISCS Grade 7	425	100.0	2368	100.0	4165	92.1	0	0.0
ISCS Gr 8/Gr 9	423	100.0	2338	94.1	2697	98.5	0	0.0
Biology 1st year	264	100.0	165	38.9	1296	39.9	0	0.0
Biology-Life Science	551	100.0	3078	92.4	4131	74.9	311	100.0
Physical Science 1st/2nd Year	236	100.0	1047	75.3	2021	64.8	0	0.0
Earth Science 1st/Adv	496	100.0	1838	95.2	4263	92.1	358	26.9

ENROLLMENT IN HIGH SCHOOL SCIENCE COURSES BY SEX

Table 13 includes the seven science courses that are considered typical of Illinois high school science offerings plus an additional seven courses that are useful in comparing male and female enrollment in remedial and advanced science courses.

Percentages of state enrollment are small in some cases, but because they are for the entire population under study, comparisons of male and female enrollments are meaningful. For example, physics 1st year has 3.45% of state male enrollment and 1.68% of state female enrollment. It is meaningful to know that male enrollment is more than twice (105%) that of females in this course.

Table 13 shows that male enrollment exceeds female enrollment in general science grade 9 by 12%, general studies biology/remedial by 16%, physical science 1st/2nd year by 15%, chemistry 1st year by 1%, chemistry advanced/ college level by 100%, and earth science 1st/advanced by 19%. Generally, male enrollment exceeds that of females in general science, earth science, remedial science, and in the physical sciences, except honors chemistry and physics. Female enrollment exceeds that of males in the biological sciences and the honors courses of chemistry and physics. Male enrollment is less than that of females in physiology/anatomy (-34%), college level biology/microbiology (-11%), biology 1st year (-8%), biology 2nd year/advanced (-15%), honors chemistry (-18%), and honors physics (-8%). Further inquiry might provide some clue as to why female enrollment in honors chemistry and honors physics slightly exceeds that of males, but male enrollment in second year and college level chemistry and physics substantially exceeds that of females.

Enrollment In High School Science By Sex And By Community Type

Table 14 reports the relative difference in percent of high school science enrollment by sex and community type. An examination of these data leads to the same generalization as when enrollment by sex alone is considered. Male enrollment is typically greater in physical sciences, general science, earth science, and remedial science; while female enrollment is greater in the biological sciences. Some variation does occur when the data are reported by community type. Male enrollment is less than female enrollment in chemistry 1st year by 6% in central city schools and by 10% in rural schools. Male enrollment exceeds that of females in honors physics by 100% and in honors chemistry by 215% in suburban schools (it should be noted that the total enrollments compared in this latter case are very small, however).

TABLE 13. ENROLLMENT IN SELECTED HIGH SCHOOL SCIENCE COURSES BY SEX

Course Title	% of State Enrollment		% Male Compared to % Female
	Male	Female	
Physics 1st Year	3.45	1.68	105.4
Physics 2nd/College Level/Independent Study	0.26	0.13	100.0
Chemistry 2nd/3rd Year/ College Level	0.64	0.41	56.1
Earth Science 1st/Adv	3.73	3.14	18.8
General Studies Biology/Remedial	1.02	0.88	15.9
Physical Science 1st/2nd Year	5.79	5.02	15.3
General Science Gr 9	5.12	4.58	11.8
Chemistry 1st Year	5.66	5.60	1.1
Honors Physics	0.12	0.13	-7.7
Biology 1st Year	12.42	13.48	-7.9
College Level Biology/ Microbiology	0.24	0.27	-11.1
Biology 2nd Yr/Adv	2.00	2.30	-15.0
Honors Chemistry	0.14	0.17	-17.6
Physiology/Anatomy	0.63	0.96	-34.4

TABLE 14. PERCENT RELATIVE DIFFERENCE IN MALE AND FEMALE ENROLLMENTS IN SELECTED HIGH SCHOOL SCIENCE COURSES BY COMMUNITY TYPE (Male Percent Relative to Female Percent Shown)

Course Title	Rural	Independent City	Suburb	Central City
General Science Grade 9	16.5	9.0	9.6	11.9
General Studies Biology/Remedial	120.0	50.0	0.0	17.2
Physiology/ Anatomy	-38.7	-22.9	-34.4	-35.2
College Level Biology/Microbiology	0.0	-10.5	-9.6	-50.0
Biology 1st year	-8.2	-7.9	-6.4	-10.2
Biology 2nd Yr/ Adv	-20.9	-18.0	0.9	-29.8
Physical Science 1st/2nd Year	12.7	7.1	14.6	34.4
Chemistry 1st Yr	-5.6	5.4	6.7	-9.5
Chemistry 2nd/3rd/ College Level	51.6	42.9	55.7	83.3
Honors Chemistry	--	--	215.1*	-19.0
Physics 1st Yr	72.5	111.6	111.6	110.7
Physics 2nd/ College Level/ Independent Study	140.0	68.8	127.8	22.2
Honors Physics	--	--	100.0	-10.4
Earth Science	11.1	15.9	22.2	17.3

*Less than 20 males and females total enrolled

Enrollment in High School Science by Sex and by School Size

The general conclusions drawn from Tables 13 and 14 are again apparent when the data are categorized by school size. Generalizations made about the data in Table 13 can be made about the data relative to school size. An exception is that male enrollment exceeds female enrollment in college level biology/microbiology, in the smallest schools and in schools of 500-999 students. The general conclusion that female enrollment is greater in most biological science courses, while male enrollment is greatest in physical sciences, general science, earth science, and remedial science is still valid. Thus, Table 13 can be viewed as an accurate and concise summary of male-female enrollment comparisons in the major science courses.

ENROLLMENT IN JUNIOR HIGH SCIENCES BY SEX

Table 10 shows that 96% of general science grade 7, 96% of general science grade 8, and 100% of all ISCS enrollments are in courses that are required. Direct comparisons of female and male enrollment in those courses are excluded from consideration in this report.

Even though relatively high percentages of students in some of the courses listed in Table 15 are in required courses, they are included to show the trend in enrollment by sex in that portion of the student population that elects the course. Biology-life science is required for 83% of the students; physical science 1st/2nd year is required of 62%; and earth science is required of 83% of those enrolled. Biology 1st year is required of fewer students (about three-eights of those enrolled).

Female enrollment exceeds that of males by 9% in biology 1st year. Male enrollment exceeds female enrollment by about 4% in biology-life science, 1% in earth science, and 13% in physical science. Even though the relative differences are small, the trend in junior high school is similar to that in high schools with male enrollment typically greater in physical sciences and female enrollment greater in the biological sciences.

Enrollment in Junior High School Science by Sex and by Community Type

Female enrollment in biology 1st year exceeds that of males in schools of all community types (see Table 16). Female enrollment is greater by 9% in rural schools, 22% in independent city schools, 2% in suburban schools, and 16% in central city schools. Female enrollment in biology-life science also exceeds that of males by 5% in rural and 6% in independent city schools but is less than male enrollment in suburban and central city schools, where the percent differences are 7% and 11% respectively.

Male enrollment exceeds female enrollment in physical science 1st/2nd year except in central city schools where enrollment is approximately equal. Male and female enrollment in earth science differ by less than 3% across schools of all community types--thus, they tend to be essentially equivalent for these schools by community type.

TABLE 15. PERCENT ENROLLMENT IN SELECTED JUNIOR HIGH SCHOOL SCIENCE COURSES BY SEX

Course Title	% of State Enrollment		% Male Compared to % Female
	Male	Female	
Biology 1st year	2.14	2.35	-8.9
Biology-Life Science	4.77	4.60	3.7
Physical Science 1st/2nd Yr	2.72	2.40	13.3
Earth Science	4.07	4.02	1.2

TABLE 16. PERCENT RELATIVE DIFFERENCE IN MALE AND FEMALE ENROLLMENTS IN SELECTED JUNIOR HIGH SCHOOL COURSES BY COMMUNITY TYPE (Male Percent Relative to Female Percent Shown)

Course Title	Rural	Independent City	Suburb	Central City
Biology 1st Yr	-9.3	-22.1	-2.4	-15.8
Biology-Life Science	-5.0	-6.1	7.0	11.2
Physical Science 1st/2nd Year	15.0	19.8	12.7	-0.7
Earth Science	-2.3	-0.2	2.5	2.7

Enrollment in Junior High School Science by Sex and by School Size

Male enrollment exceeds female enrollment in biology 1st year by 17% in schools of 200-499 students, but is less than that of females in biology 1st year for all other school size categories (11% less in the smallest schools, 13% less than in schools of 500-999, and by 6% less in the largest schools).

For biology-life science, male enrollment exceeds that of females by 8-17% in schools of more than 500 students. Female enrollment is slightly greater (4%) than male enrollment in schools of 200-499.

Male enrollment in physical science 1st/2nd year is greater than female enrollment in schools of all sizes--ranging up to 48% greater in the largest junior high schools.

Female enrollment and male enrollment in earth science in the three smallest size schools differ very little (about 1% maximum). But, male enrollment exceeds that of females in the largest schools by about 14%.

It is apparent that the data in Table 15 which compare male and female enrollment are more fully explained when categorized by community type or school size. Even so, an examination of each community type or school size category reveals that female enrollment exceeds male enrollment in most cases for biological science (11 of 16 cells in Tables 16 and 17 combined). Also, male enrollment exceeds that of females in 7 of 8 cells for physical science. In five of eight cells, female enrollment in earth science exceeds that of males but by margins of less than 2% in four of the five.

It is likely that the required status of the courses considered in Table 15 influences the data summarized, but it also appears that the pattern of male enrollment exceeding female enrollment in physical science and female enrollment exceeding male enrollment in biological sciences, that is evident in high schools, can be found also to a degree in junior high school.

TABLE 17. PERCENT RELATIVE DIFFERENCE IN MALE AND FEMALE ENROLLMENTS IN SELECTED JUNIOR HIGH SCHOOL COURSES BY SCHOOL SIZE (Male Percent Relative to Female Percent Shown)

Course Title	< 200	200-499	500-999	1000 >
Biology 1st Yr	-10.9	16.7	-13.1	-5.6
Biology-Life Science	2.5	-4.0	8.2	16.7
Physical Science 1st/2nd Yr	6.9	1.9	13.7	47.9
Earth Science	-0.5	-1.0	-1.2	13.7

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